

Claims

- [1] A display comprising a backlight and a spatial light modulator for modulating light from the backlight, the backlight having a light-output surface, at least one portion of which comprises a plurality of first regions arranged to output light in a multiple-view mode of the display, the whole of the at least one portion being arranged to output light in a single-view mode of the display.
- [2] A display as claimed in claim 1, in which the at least one portion comprises a plurality of second regions arranged to output light alternately with the first regions for temporal multiplexing of views in the multiple-view mode.
- [3] A display as claimed in claim 1, in which the at least one portion comprises a plurality of second regions with the first and second regions being independently controllable to emit light for observer tracking in the multiple-view mode.
- [4] A display as claimed in any one of the preceding claims, in which the first regions comprise first light-redirecting elements adapted to redirect light travelling in a first direction but not a second direction towards the spatial light modulator, and in which a remainder of the at least one portion comprises second light-redirecting elements adapted to redirect light travelling in the second direction but not the first direction towards the spatial light modulator.
- [5] A display as claimed in claim 4, in which the first and second directions are substantially orthogonal.
- [6] A display as claimed in claim 4 or 5, in which the backlight comprises: a light guide on which the light-redirecting elements are disposed, a first light source for supplying light to the light guide in the first direction, and a second light source for supplying light to the light guide in the second direction.
- [7] A display as claimed in any one of claims 1 to 5, in which the backlight comprises: a first light guide having the first regions; a first visible light source for supplying light to the first light guide; a second light guide having a remainder of the at least one portion; and a second visible light source for supplying light to the second light guide.
- [8] A display as claimed in claim 7, in which the first light guide has a higher refractive index than the second light guide.
- [9] A display as claimed in claim 7 or 8, in which the first light guide is disposed on an output surface of the second light guide.
- [10] A display as claimed in any one of claims 7 to 9, when dependent on claim 4, in which the first and second light sources are arranged to supply light in the first and second directions respectively.
- [11] A display as claimed in any one of claims 7 to 10, when dependent on claim 4, in which the first and second light-redirecting elements are provided on a surface of each of the first and second light guides respectively.
- [12] A display as claimed in any one of claims 7 to 11, in which each of the first and

- second light guides comprises at least one waveguide.
- [13] A display as claimed in any one of claims 7 to 11, in which each of the first and second light guides comprises a plurality of optical fibres.
- [14] A display as claimed in claim 7, in which the first and second light guides are separated from each other by a material of lower refractive index.
- [15] A display as claimed in claim 14, in which the material of lower refractive index is air.
- [16] A display as claimed in any one of claims 7 to 15, in which non-input and non-output surfaces of the first and second waveguides are at least partially covered by a non-transmissive material.
- [17] A display as claimed in claim 16, in which the non-transmissive material is reflective.
- [18] A display as claimed in any one of claims 1 to 5, in which the backlight comprises: a light guide, a visible light source for supplying light to the light guide, first fluorescent material forming the first regions, and a first ultraviolet light source for illuminating the fluorescent material.
- [19] A display as claimed in claim 18, comprising filter material disposed between the backlight and the first regions for blocking visible light and for passing ultraviolet light from the first ultraviolet light source to the first regions.
- [20] A display as claimed in claim 18 or 19, comprising filter material disposed between the at least one portion and the spatial light modulator for blocking ultraviolet light.
- [21] A display as claimed in any one of claims 18 to 20, when dependent on claim 4, in which the visible and ultraviolet light sources are arranged to supply light in the first and second directions respectively.
- [22] A display as claimed in claim 21, in which the first and second light-redirecting elements are provided on a surface of the light guide.
- [23] A display as claimed in any one of claims 18 to 22, in which the first fluorescent material is dispersed in a visible light scattering medium.
- [24] A display as claimed in any one of claims 18 to 23, in which the first fluorescent material of each first region is arranged to emit light of two colour components.
- [25] A display as claimed in any one of the preceding claims, in which the at least one portion comprises a plurality of third regions arranged to output light in a further multiple-view mode of the display.
- [26] A display as claimed in claim 25, when dependent on claim 18, in which the plurality of third regions are formed by second fluorescent material, the backlight comprising a second ultraviolet light source, the first and second ultraviolet light sources being arranged to emit first and second wavelengths in response to which the first and third fluorescent materials, respectively, fluoresce.

- [27] A display as claimed in claim 25 or 26, in which the first and third regions are substantially disposed in first and second planes, respectively, which are spaced apart in a direction of light output from the backlight.
- [28] A display as claimed in claim 25, 26 or 27, in which the first and third regions extend in orthogonal directions.
- [29] A display as claimed in any one of the preceding claims, comprising an array of lenses at the first regions.
- [30] A display as claimed in claim 1, in which the at least one portion comprises a plurality of second regions arranged to output light in the multiple-view mode.
- [31] A display as claimed in claim 2, 3 or 30, comprising an array of lenses, with each lens of the array being arranged to receive light from at least one first region and at least one second region and to direct the received light in first and second different directions respectively towards the spatial light modulator.
- [32] A display as claimed in claim 31, in which the first and second regions are arranged to output light simultaneously in the single-view mode of the display.
- [33] A display as claimed in claim 31 or 32, comprising a plurality of further regions, with each lens of the array being arranged to receive light from at least one further region and to direct the light in a further direction, different to the first and second directions, towards the spatial light modulator.
- [34] A display as claimed in claim 33, in which the first, second and further regions are arranged to output light simultaneously in the single-view mode of the display.
- [35] A display as claimed in any one of the preceding claims, in which the first regions are elongate.
- [36] A display as claimed in claim 35, in which the first regions are substantially parallel.
- [37] A display as claimed in claim 36, in which the first regions are substantially uniformly spaced apart.
- [38] A display as claimed in any one of the preceding claims, in which the spatial light modulator has a transmissive mode of operation.
- [39] A display as claimed in claim 38, in which the spatial light modulator is a liquid crystal device.